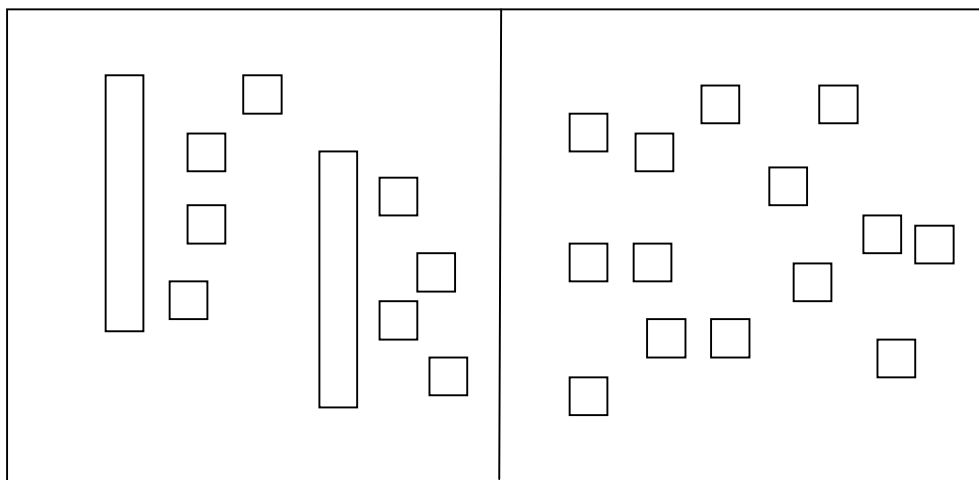


TASK 2.9.1: ALGEBRA TILES

Solutions

Work with a partner. One person will use the tiles to solve the equations. The partner will record the steps symbolically. Both will answer the questions.



- On a separate sheet of paper, the recorder will write the original equation.
 $2x + 8 = 14$ or $2(x + 4) = 14$
- What does this equation represent? Write your explanation in words. These tiles can be represented symbolically two different ways: $2(x + 4) = 14$ or $2x + 8 = 14$. The first representation says 2 times the set of some number plus 4 equals 14. The other says 2 times a number plus 8 equals 14.
- Use the tiles to solve the equation. Each of the two different representations has different solution methods. If the students recorded $2(x + 4) = 14$, they might divide both sides by 2, i.e., separate each side into 2 equal groups: $2(x + 4) = 2(7)$ so $x + 4 = 7$. Then subtract 4 to find $x = 3$.

The solution to $2x + 8 = 14$ has multiple approaches. One is to again divide both sides by 2 to achieve $x + 4 = 7$ and then subtract 4 from each side, or begin by subtracting 8 first then divide by 2. If students only use one approach, model the other. See math notes.

- Using your graphing calculator, enter one side of the equation in y_1 and the other side of the equation in y_2 . What is a good viewing window for these equations? Record your window on your paper. Sketch the graphs on your paper. Explain the intersection of the two lines. Have a class discussion about “good viewing window”. Student will realize that a good viewing window shows the intersections, and if possible, the window should

Algebra I: Strand 2. Linear Functions; Topic 9. Concrete Models; Task 2.9.1

show other important or critical information about the functions. This can include y -intercepts and x -intercepts.

Sample viewing window.

```
WINDOW
Xmin=-1
Xmax=5
Xscl=1
Ymin=-5
Ymax=20
Yscl=0
Xres=1
```

5. Go to the table function on your calculator. Explain how the calculator determines the data for each of the columns on the table. How can you find the solution to the linear equation in the table? How does the data in the table relate to your graph? How does the data in the table relate to your equation?

In the table, the solution is the x -value that makes y_1 and y_2 the same value. This coordinate point (x, y_1) and (x, y_2) will be the same and thus will be the intersection of the graphs of the equations.

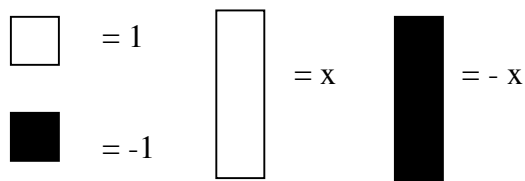
Math notes and additional answers

Algebra tiles allow students to visualize the symbolic manipulations required in solving equations. This linking of a geometric approach to algebra concepts provides a bond between concrete and symbolic that opens the door of understanding to include a more diverse audience and address different learning strategies.

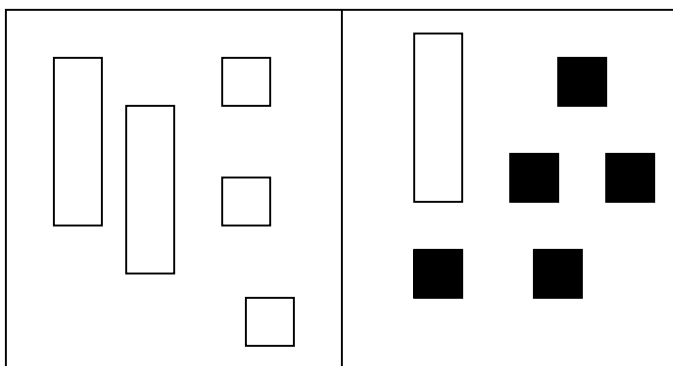
Before beginning this activity, participants need to examine the tiles and relate each value (unit, x , and x^2). For many this may be the first time they have encountered a visualization of x^2 . Participants should recognize that red or shaded tiles always represent the negative value and that a positive tile with its corresponding negative tile produces a zero pair.

At the same time that students are using tiles to “visualize” the symbolic manipulation of algebra, we want them to make the connection to the graphical and tabular representations. Using the graphing calculator helps connect the concrete and symbolic representations to the graphical and tabular.

This is a key to the algebra tiles representations:



For example:



The mat is used to represent the two sides of the equation. The line down the center of the mat represents the equal sign. Nothing “crosses” the line (equal sign). The same action is taken on both sides. The equation here is :

$$2x + 3 = x - 5$$

Algebra I: Strand 2. Linear Functions; Topic 9. Concrete Models; Task 2.9.1

#3

Students need to understand that there are multiple ways to solve equations. Provide students with several similar equations:

$$3x + 12 = 6x$$

$$2x + 8 = 4x - 2$$

$$6x - 20 = 4x - 10$$

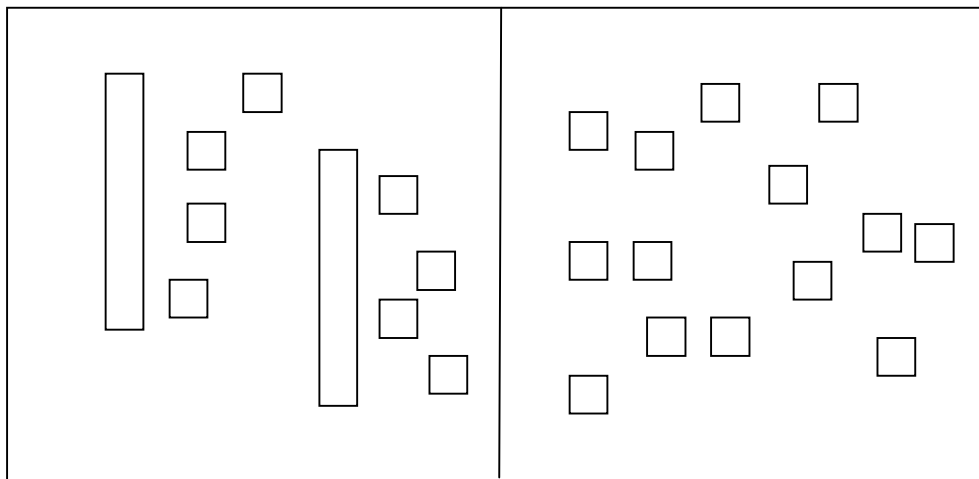
In each of these equations, dividing by a common factor is one way to begin solving the equations. Students need to compare the previous equations with

$$2x + 5 = 4x - 1$$

In this case, dividing (though possible) would tend to complicate the solution process.

TASK 2.9.1: ALGEBRA TILES

Work with a partner. One person will use the tiles to solve the equations. The partner will record the steps symbolically. Both students will answer the questions.



1. On a separate sheet of paper, the recorder will write the original equation.
2. What does this equation represent? Write your explanation in words.
3. Use the tiles to solve the equation.
4. Using your graphing calculator enter one side of the equation in y_1 and the other side of the equation in y_2 . What is a good viewing window for these equations? Record your window on your paper. Sketch the graphs on your paper. Explain the intersection of the two lines.
5. Go to the table function on your calculator. Explain how the calculator gets the data for each of the columns on the table. How can you find the solution to the linear equation on the table? How does the data on the table relate to your graph? How does the data on the table relate to your equation?